

1                   **DYNAMIC STORAGE COMPARTMENT FOR VEHICLE DOOR**

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3                   FIELD OF THE INVENTION

4                 This invention relates to storage compartments, and  
5                 particularly relates to storage compartments designed to  
6                 utilize space within an automobile door or the like moving  
7                 vehicle, and more particularly to a door mounted storage device  
8                 capable of movement in response to a door window position.

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10                  BACKGROUND OF THE INVENTION

11                 It is customary in many cases for a middle arm rest of the  
12                 front seat of a vehicle to be used as a storage compartment or  
13                 provided with areas where articles may be placed or deposited.  
14                 In particular, cup and can holders, ashtrays or oddments trays  
15                 are often fastened to the front end of the arm rest. When not  
16                 in use, they may be inserted into the arm rest to eliminate  
17                 risks of injury and avoid clutter. Door panels are often  
18                 provided with small pockets for holding maps or small items.  
19                 Door armrests may be provided with a hinged upper portion to  
20                 facilitate storage of small oddments or maps.

21                 In airplanes all handbags and pocketbooks must be stored  
22                 either in the overhead compartment or under the forward seat.  
23                 Such precautions are necessary because they can become missiles  
24                 in the event of severe turbulence or a crash. In airplanes,

1       the greatest risk is during take-off and landing but in car  
2       travel the risk of accident is continuous. The need to store  
3       pocketbooks is therefore continuous.

4           However, within the limited interior space of most  
5       vehicles, especially those constructed without a middle  
6       armrest, typically there are not provisions for storage of  
7       larger articles such as a women's handbag. Handbags are often  
8       placed on top of a seat within the passenger compartment or  
9       they are dropped into the floor area for storage during  
10      driving. These unsecured articles may create a dangerous  
11      condition in the event of an accident, wherein they may act as  
12      projectiles flying though the air.

13       Women have long sought for a place to store their handbags  
14      to be conveniently available when needed. There are innumerable  
15      examples of working women and stay at home moms taking their  
16      children to school or elsewhere and passing a drive-in to pick  
17      up coffee, a soda, dinner or a snack. The handbag is often in  
18      the back seat and a hassle ensues to retrieve it. The same is  
19      true when passing a toll booth. No storage area exists that is  
20      specifically constructed to accommodate a handbag.

21       In addition, theft of personal articles from automobiles  
22      is an ever-growing problem. The use of vehicle alarms, while  
23      of benefit in reducing the number of actual vehicle thefts, is  
24      of little value in reducing the number of so-called "smash &

1 grab" robberies. These robberies are events of opportunity,  
2 often precipitated by the perpetrator's ability to view the  
3 object of their desire, at which point they can quickly break  
4 in, grab the merchandise, and quickly get away, before the  
5 tripping of an alarm device becomes a matter of any  
6 consequence.

7 What is lacking in the art is a device for securely and  
8 inconspicuously storing valuable items, such as a woman's  
9 handbag, within an automobile door cavity so as to provide  
10 convenience, increase safety and reduce the likelihood of  
11 theft. The storage space should provide some degree of side  
12 impact shock absorption and the storage space should provide  
13 some dis-incentive to break into a car for valuables.

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15 DESCRIPTION OF THE PRIOR ART

16 Various attempts have been made in the prior art to  
17 develop means for storing personal items in a manner to provide  
18 personal convenience and to keep the stored articles out of  
19 view.

20 For example, Barker, U.S. Patent No. 4,023,873, discloses  
21 a combination armrest, trash receptacle, ashtray and cash  
22 container formed from an elongated rectangular member having a  
23 horizontal top forming an arm rest. The horizontal section is  
24 provided with a hinge rod and the horizontal member having

1 three separate doors hinged to the rod so that the three  
2 compartments therein can be separately opened.

3 Laesch, U.S. Patent No. 5,613,723, discloses a storage  
4 armrest mounted on a vehicle door. The storage armrest  
5 includes a door hingedly mounted thereon, with a hold-open  
6 device integrally molded on the door and in the storage  
7 compartment. The hold-open device includes a substantially one-  
8 fourth circle cam molded on an inner surface of the door, and  
9 a flex finger molded on an upper surface of the storage  
10 compartment. The flex finger serves to hold the door open until  
11 manually forced downwardly, thereby bending the flex finger  
12 while the cam moves therewith to allow the door to be closed.

13 Ramanujam, U.S. Patent No. 5,967,594, discloses a vehicle  
14 door structure having an armrest which is retractable such that  
15 it projects into the vehicle when the door is closed and is  
16 retracted against the door when the door is open.

17 Johnson et al, U.S. Patent No. 6,161,896, disclose a  
18 storage system for an automotive vehicle which is preferably  
19 deployed underneath the rear seat structure, for example, below  
20 the seat bottom structure. The storage system can include any  
21 number and combination of selectively operable sliding trays,  
22 pivoting trays, collapsible trays, pivoting lids, storage bins,  
23 and track systems.

24 Radcliffe, U.S. Patent No. 4,832,241, discloses a vehicle

1 portable-office organizer designed to be detachably mounted to  
2 the passenger seat of a vehicle.

3 Various patents are directed to center consoles located  
4 between the driver and passenger seats. These patents include  
5 U.S. Patent Nos. 6,419,314, 6,264,261, 5,076,641, 6,135,529,  
6 6,033,015, 4,417,764, and 6,497,441.

7 Scheerhorn, U.S. Patent No. 6,419,314, discloses a center  
8 console armrest storage compartment which includes a hinged  
9 cover assembly including a base hinged to the storage  
10 compartment and a cover slidably mounted to the base by a slide  
11 assembly. The slide assembly, in one embodiment, includes a U-  
12 shaped rod which is secured to the base and a pair of sleeves  
13 mounted to the cover with a polymeric slide material extending  
14 between the rod and sleeves to allow the cover to slide  
15 forwardly and aft with respect to the base. In a preferred  
16 embodiment, the base, when uncovered by moving the cover  
17 forwardly, includes a storage tray, cup holder or other  
18 accessory, which is stacked above the storage compartment.

19 De Angelis et al., U.S. Patent No. 6,135,529, disclose a  
20 multi-position sliding center console for a vehicle and a guide  
21 member for mounting the console to the vehicle. The center  
22 console is of the type including at least one storage  
23 compartment and an associated lid. The guide member defines a  
24 reciprocal path from a first end of the guide to a second end

1 of the guide. The first end of the guide is adjacent a set of  
2 front passenger seats and the second end of the guide is  
3 adjacent a set of rear passenger seats. A carriage is  
4 operatively coupled between the console and the guide member  
5 for slidably moving the console on the guide member along the  
6 reciprocal path between the front and rear passenger seats.

7 Krafcik, U.S. Patent No. 6,264,261, discloses a vehicle  
8 console which is adapted to store a child safety seat and is  
9 further adapted to operatively and movably support and position  
10 the child safety seat within the vehicle. The console includes  
11 a pair of child seat attachment members which removably connect  
12 the child safety seat to the console, and a lip or flange  
13 portion which allows the child safety seat to be securely  
14 supported by the console when deployed within the vehicle.

15 Lindberg, U.S. Patent No. 5,076,641, discloses a center  
16 console vehicle armrest which includes a storage compartment  
17 formed therein and having a cover which opens in two directions  
18 to increase accessibility to the inside of the compartment. A  
19 preferred embodiment includes an intermediate ring pivotally  
20 coupled to the cover and to the compartment and latches for  
21 allowing the cover and ring to pivot open in one direction and  
22 the cover to pivot open in another direction

23 Husted, U.S. Patent No. 6,033,015, discloses an armrest  
24 assembly comprising a bin defining a storage compartment and a

1 cover hinged to the bin for movement between open and closed  
2 positions. A shaft rotatably supports the cover on the bin for  
3 pivotal movement of the cover relative to the bin. A helical  
4 torsion spring is coiled about the shaft and has one end  
5 reacting with the bin and the other end reacting with the cover  
6 for continuously urging the cover to the open position. A  
7 detent, having at least one camming surface, is disposed on the  
8 shaft for engaging the bin and is rotatable with the cover for  
9 retaining the cover in at least one detent position. The detent  
10 is located between the bin and the spring. Accordingly, the  
11 spring continuously biases the detent axially against the bin  
12 and also continuously biases the cover to the open position.

13 Bargiel, U.S. Patent No. 6,508,508, discloses an armrest  
14 storage unit comprising a compartmentalized pullout armrest  
15 assembly which includes a cover, an armrest storage  
16 compartment, and a seat cushion with an understorage  
17 compartment. The armrest storage compartment includes  
18 maneuverable dividers for changing the storage compartment as  
19 desired, a removable coin holder and a power supply. The  
20 armrest assembly can be positioned to provide a third seat.

21 Marcus et al., U.S. Patent No. 4,417,764, disclose an  
22 armrest for a vehicle which integrally includes a drawer having  
23 a holder for different types and sizes of beverage containers.  
24 The drawer is releasably secured within a compartment, integral

1 with the armrest, and includes a floor having an aperture  
2 therethrough for receiving generally cylindrical objects such  
3 as cups. U-shaped legs are pivotally mounted under the floor to  
4 be positioned below the apertures to support the bottom of a  
5 cylindrical container. In the preferred embodiment the  
6 compartment further includes a slide with recesses for holding  
7 a writing instrument and writing media such that the slide  
8 forms a support for writing on the media.

9       Mahmood et al., U.S. Patent No. 6,497,441, disclose a  
10 multipurpose console for use in a vehicle having a support  
11 structure having an internal compartment, a latching mechanism  
12 being fixedly secured to a lower surface of the support  
13 structure and providing a means for releasably engaging a  
14 mounting member of the vehicle. The internal compartment has a  
15 lid pivotally secured to an upper portion of the support  
16 structure and moves between a first position and a second  
17 position. The lid covers the internal compartment when the lid  
18 is in the first position and the lid has an upper portion and  
19 a lower portion. The upper portion is pivotally secured to the  
20 lower portion for movement between the first position and the  
21 second position. The upper portion and the lower portion define  
22 a surface area for changing a child's diaper when the upper  
23 portion is in the second position. The internal compartment  
24 provides a plurality of storage areas for products necessary to

1 facilitate the changing of the child's diaper. The multipurpose  
2 console also includes an electronic entertainment device.

3 Prior art patents which are directed to door-mounted  
4 storage armrests (U.S. Patent Nos. 3,104,131, 4,023,873 and  
5 5,613,723) do not disclose storage compartments which extend  
6 into the vehicle door cavity to provide a deeper storage area.  
7 The instant invention satisfies a long-felt need for adequate  
8 and accessible vehicle storage by providing a device which is  
9 designed to be placed in a recessed position within the vehicle  
10 door cavity, thereby taking advantage of the increased depth  
11 thus obtained.

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1        SUMMARY OF THE INVENTION

2            The present invention provides means for expanding the  
3        usable interior space of a vehicle, either as original  
4        equipment installed by the manufacturer or as an after-market  
5        modification, so as to provide a means for providing storage  
6        capacity for a vehicle which is characterized by ease of use  
7        and the ability to provide secure storage for women's handbags.

8            To achieve this result, the instant invention utilizes the  
9        interior space of a vehicle door. The invention utilizes the  
10      space within the vehicle door and still accommodates the  
11      opening of the car window. This is accomplished by having a  
12      box within a box, the inner box being slightly smaller, which  
13      pushes forward one half inch to accommodate the window as it  
14      comes down upon opening. There are small covered springs  
15      attached to the outer frame, at each corner of the outer box,  
16      which springs are attached to the inner box, keeping the two  
17      boxes aligned and providing some energy to push the inner box  
18      back into the door cavity as the window is raised. The  
19      exterior covering of the outer box is a reinforced pleated  
20      vinyl or leather in conformity with the cars interior. The  
21      material and pleats provide for expansion as well as the side  
22      flaps.

23            The storage compartment has, opposite sides, a top and a  
24        bottom for connecting peripheral portions of a front and a back

1 panel member so that the panel members face each other to form  
2 front and back inner boundaries of an interior portion of the  
3 storage compartment, a interior portion which is preferably  
4 accessible from the top side or front side of the storage  
5 compartment. The interior portion of the storage compartment  
6 may also include padding to further protect the stored items.

7 The construction of the storage compartment facilitates  
8 storage of many different sizes and types of articles, e.g. a  
9 make-up bag, handbag, pocket book, writing instruments,  
10 smoker's requisites, a headset or the like. In an advantageous  
11 development of the invention, the storage compartment is  
12 provided with a closable covering means illustrated generally  
13 as a flap, roller blind or lid. The covering means is  
14 advantageously capable of pivoting about an axis at the edge of  
15 the recess, or winding around an axis in combination with a  
16 spring retraction mechanism, wherein the point at which the  
17 axis is provided is preferably at or along the edge of the  
18 storage area in which is situated for placement of articles  
19 within the storage compartment. In addition, the covering  
20 means is preferably latchable such that articles may be secured  
21 so that they remain in position, particularly in the event of  
22 an accident. In this manner, the contents of the storage  
23 compartment are fixed in position and, particularly in the  
24 event of an accident, the risk of injury from flying articles

1 or as a result of impact with hard inner surfaces of the  
2 storage compartment is avoided. Thus, the covering means in  
3 the present invention is a device for safeguarding the contents  
4 of the storage compartment.

5 It is also conceivable to design the storage compartment  
6 as a shock absorber which may be used to cushion side impacts  
7 of the vehicle. In this embodiment the outside of the roller  
8 blind or lid may be provided with a covering and, optionally,  
9 a thin layer of padding. The visual appearance of the storage  
10 compartment is also enhanced in this manner.

11 Accordingly, it is a primary objective of the instant  
12 invention to provide enhanced vehicle storage capacity by  
13 utilizing the heretofore unused space within a vehicle's door  
14 by way of provision of a dynamic receptacle for accommodating  
15 bulky items, such as women's handbags therein.

16 It is a further objective of the instant invention to  
17 provide enhanced and coverable storage capacity which places  
18 articles within the vehicle out of view, so as to reduce the  
19 incidence of theft.

20 It is yet another objective of the instant invention to  
21 provide in-door storage the volume of which is adjustable as a  
22 function of window position.

23 Still another objective of the instant invention is to  
24 provide an additional, easily accessible storage compartment

1 useful for women's handbags.

2 Still yet another objective of the instant invention is to  
3 provide a storage compartment utilizing space within the  
4 vehicle door cavity while the functionality of the window and  
5 other equipment contained within the door are retained.

6 Other objects and advantages of this invention will become  
7 apparent from the following description taken in conjunction  
8 with the accompanying drawings wherein are set forth, by way of  
9 illustration and example, certain embodiments of this  
10 invention. The drawings constitute a part of this  
11 specification and include exemplary embodiments of the present  
12 invention and illustrate various objects and features thereof.

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1        BRIEF DESCRIPTION OF THE FIGURES

2              Figure 1 is a perspective view of a preferred embodiment  
3        of the instant invention illustrated secured within a vehicle  
4        door;

5              Figure 2 is a partially exploded view of the preferred  
6        embodiment illustrated in Figure 1;

7              Figure 3 is an exploded view of the preferred embodiment  
8        of the instant invention;

9              Figure 4 is section view along lines 1-1 of Figure 1  
10      illustrating the relative motion of the front and back panels  
11      with respect to downward motion of the vehicle window;

12          Figure 5 is a perspective view of an alternative  
13      embodiment of the instant invention illustrated secured within  
14      a vehicle door;

15          Figure 5A is a perspective view of the embodiment  
16      illustrated in Figure 5;

17          Figure 5B is a front view of the embodiment illustrated in  
18      Figure 5;

19          Figure 5C is a partial front view of the embodiment shown  
20      in Figure 5 illustrated with the front panel removed;

21          Figure 5D is a partial perspective view of the embodiment  
22      shown in Figure 5;

23          Figure 5E is a bottom view of the embodiment illustrated  
24      in Figure 5;

1       Figure 5 is a partial front view of the embodiment shown  
2       in Figure 5 illustrating the pivotal movement of the top flap  
3       member;

4       Figure 6 is a partially exploded view of the embodiment  
5       illustrated in Figure 5;

6       Figure 7 is section view along lines 2-2 of Figure 5  
7       illustrating the relative motion of the front and back panels  
8       with respect to downward motion of the vehicle window;

9       Figure 8 is a perspective view of an alternative  
10      embodiment of the instant invention;

11      Figure 9 is a perspective view of an alternative  
12      embodiment of the instant invention;

13      Figure 10 is a perspective view of an alternative  
14      embodiment of the instant invention;

15      Figure 11 is a perspective view of an alternative  
16      embodiment of the instant invention.

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1        DETAILED DESCRIPTION OF THE INVENTION

2            The instant invention provides a storage compartment  
3        adapted for insertion within and upon an interior panel of a  
4        vehicle door. With reference to Figures 1 and 2, a storage  
5        compartment 100, having a front panel member 10, a back panel  
6        member 12 and a center panel member 14 is provided. The  
7        storage compartment 100 is constructed and arranged for  
8        mechanical engagement within and upon a surface of an interior  
9        panel 23 of a vehicle door 22. Neither the interior panel 23  
10      or the vehicle door 22 constitute a part of the instant  
11      invention. Such mechanical engagement can be achieved by any  
12      suitable fastening means, for example a combination of  
13      brackets, screws, rivets, clips or the like, which are affixed  
14      within an interior or hidden portion of the vehicle door panel,  
15      at various points where the surfaces come together.  
16      Alternatively, it is contemplated that the storage compartment  
17      could be provided with integral attachment means, such as  
18      deformable tabs (not shown) or the like which would enable  
19      secure engagement of the storage compartment 100, upon  
20      insertion within said vehicle door panel. Placement of said  
21      storage compartment 100 within and upon said interior panel 22,  
22      as illustrated, provides a storage area which is at least  
23      partially recessed within an interior portion 24 of the vehicle  
24      door. Referring to Figures 4 and 7, the construction and  
25      arrangement of the instant invention is such that it cooperates

1       with the door window 54 to slide the storage area 100 outwardly  
2       from the interior area 24 of the door 23 during downward  
3       movement of the window and inwardly into the door cavity during  
4       upward movement of the window.

5               Referring to Figure 3 illustrating a preferred embodiment  
6       of the present invention, the back panel member 14 includes a  
7       back surface 16, opposite sides 18 and 20, a top 26 and a  
8       bottom 28. The sides, top and bottom each extending generally  
9       perpendicular to the back surface 16. In a most preferred  
10      embodiment the sides, top and bottom surfaces extend about one  
11      and one half inches from the back surface and are constructed  
12      and arranged to telescope inwardly and outwardly with respect  
13      to the center member 12. The back panel member 14 also  
14      includes a means for pressing the back panel member into the  
15      center member 12 in a telescoping manner during downward  
16      movement of the vehicle door window 54 (Figures 4 and 7),  
17      illustrated herein as a ramping surface 36. The ramping  
18      surface 36 extends between the top 26 and back 16 surfaces to  
19      cooperate with the window 54 located within the vehicle door  
20      22. The back panel member 14 also includes a means for  
21      pressing back panel member outwardly with respect to the center  
22      member 12 and into the door cavity 24 during upward movement of  
23      the vehicle door window 54. In the preferred embodiment the  
24      means for pressing the back panel member outward includes a  
25      plurality of spring members 56 located within spring pockets 58

1 integrally formed within the center member 12. The back panel  
2 member is preferably constructed of a polymeric material by  
3 methods well known in the art such as injection molding. The  
4 back panel member may also include an integrally formed or  
5 securely attached padded surface (not shown) to protect  
6 articles stored within the storage compartment.

7 The front panel member 10 includes a front surface 30  
8 having an aperture 31 therethrough for placing articles within  
9 the storage compartment 100, opposite sides 32 and 34, a top 72  
10 and a bottom 78. The front member 10 also preferably includes  
11 a covering means 42 movable between a first open position,  
12 wherein articles may be placed within the storage compartment,  
13 and a second closed position, wherein the covering means is  
14 juxtaposed to and covering the aperture 31.

15 The center member 12 is constructed and arranged for  
16 mechanical engagement within and upon a surface of an inner  
17 panel 23 of a vehicle door 22. The center member 12 having  
18 opposite sides 44 and 46, a top 48 and a bottom 50 for  
19 connecting peripheral portions of the front and back panel  
20 members 12, 14 so that the panel members face each other to  
21 form front and back inner boundaries of an interior portion of  
22 the storage compartment. In the preferred embodiment the sides  
23 18 and 20, top 26 and bottom 28 of the back panel member 14 are  
24 constructed and arranged to telescope inwardly and outwardly  
25 within the sides 44 and 46, top 48 and bottom 50 of the center

1 member 12. Extending at least partially around the perimeter  
2 of the center member 12 is a means of attaching the center  
3 member to the inner surface of a door panel illustrated herein  
4 as a flange 40. The flange preferably includes a plurality of  
5 apertures 52 for fasteners well known in the art.

6 Figures 1 through 11 illustrate alternative embodiments of  
7 the covering means 42. Referring to Figure 8, the covering  
8 means 42 is illustrated in the form of a flexible flap 60. In  
9 this embodiment, the flexible flap is flexibly engaged with the  
10 front panel member 10 so as to enable the flap 60 to be lifted  
11 to gain access to the interior storage area. The flap may also  
12 include a fastening member 62 to releasably engage the front  
13 panel member 10. In this embodiment the front surface 30 may  
14 be constructed of a flexible material or rigid material or a  
15 suitable combination thereof.

16 Referring to Figure 9, the covering means 42 is  
17 illustrated in the form of a rigid plate 64. In this  
18 embodiment the rigid plate 64 is pivotally connected via a  
19 hinge 66 to the front panel member 10 so as to enable the rigid  
20 plate 64 to be opened to gain access to the interior storage  
21 area.

22 Referring to Figure 10, the covering means 42 is  
23 illustrated in the form of a plurality of narrow elongated  
24 rigid elements 68 flexibly connected in an adjacent  
25 relationship. The terminal elongated rigid element 70 being

1       flexibly connected to the front panel member 10 so as to enable  
2       the covering means to be retracted to a position juxtaposed to  
3       the sides 32-34, top 72 or bottom 78 of the front panel member  
4       to gain access to the interior storage area.

5           Alternatively, the plurality of narrow elongated rigid  
6       elements 68 may be arranged to wind around an axle 72 (Figure  
7       3) in a series of concentric loops 74 (Figure 4) in cooperation  
8       with a spring retraction mechanism 76 (Figure 3).

9       Referring to Figure 11 the covering means 42 is illustrated  
10      having a plurality of elongated rigid elements 68 arranged to  
11      form a plurality of accordion-like folds. The terminal fold 72  
12      being connected to the front panel member 10 so as to enable  
13      the covering means 42 to be retracted to a position juxtaposed  
14      to the sides, top or bottom of said front panel member to gain  
15      access to the interior storage area.

16       Referring to Figures 2 and 3 the covering means 42 is  
17      illustrated in the form of a flexible sheet 78. In this  
18      embodiment, the flexible sheet is flexibly engaged with the  
19      front panel member 10 so as to enable the sheet 78 to be lifted  
20      to gain access to the interior storage area.

21       Alternatively, the flexible sheet 78 may be arranged to  
22      wind around an axle 72 (Figure 3) in a series of concentric  
23      loops 74 (Figure 4) in cooperation with a spring retraction  
24      mechanism 76 (Figure 3).

25       Referring to Figures 5-7 a further alternative embodiment

1 of the covering means 42 is illustrated. In this embodiment  
2 the covering means includes a pleated 80 front surface 30 and  
3 a lid member 82 to gain access to the interior storage area.  
4 The lid member 82 further includes a keyhole slot 84  
5 constructed and arranged to cooperate with a pin member 86 in  
6 the front surface 80 and a hingedly connected bottom 78 to  
7 allow the front panel member to substantially flattened against  
8 the inner door panel 23. Releasing the pin member 86 from the  
9 lid member 82 allows the bottom 78 to pivot downwardly thereby  
10 increasing the internal storage space.

11 All patents and publications mentioned in this  
12 specification are indicative of the levels of those skilled in  
13 the art to which the invention pertains. All patents and  
14 publications are herein incorporated by reference to the same  
15 extent as if each individual publication was specifically and  
16 individually indicated to be incorporated by reference.

17 It is to be understood that while a certain form of the  
18 invention is illustrated, it is not to be limited to the  
19 specific form or arrangement herein described and shown. It  
20 will be apparent to those skilled in the art that various  
21 changes may be made without departing from the scope of the  
22 invention and the invention is not to be considered limited to  
23 what is shown and described in the specification and  
24 drawings/figures.

25 One skilled in the art will readily appreciate that the

1 present invention is well adapted to carry out the objectives  
2 and obtain the ends and advantages mentioned, as well as those  
3 inherent therein. The embodiments, methods, procedures and  
4 techniques described herein are presently representative of the  
5 preferred embodiments, are intended to be exemplary and are not  
6 intended as limitations on the scope. Changes therein and other  
7 uses will occur to those skilled in the art which are  
8 encompassed within the spirit of the invention and are defined  
9 by the scope of the appended claims. Although the invention  
10 has been described in connection with specific preferred  
11 embodiments, it should be understood that the invention as  
12 claimed should not be unduly limited to such specific  
13 embodiments. Indeed, various modifications of the described  
14 modes for carrying out the invention which are obvious to those  
15 skilled in the art are intended to be within the scope of the  
16 following claims.

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